STATUS AND DISTRIBUTION OF BIODIVERSITY IN WESTERN GHATS OF KARNATAKA

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SUMMARY

A literature survey work was carried out to understand the amount literature available on the distribution biodiversity of western ghats, to identify the priority areas for conservation efforts, to identify the taxa which need more attention and to identify the areas which were hitherto neglected and need immediate attention. Various research institutions and universities were visited for the purpose and the literature on the published work on the western ghat was compiled. The results indicate that the studies are concentrated in Uttara Kannada, Dakshina Kannada, Mysore and Kodagu districts and the districts which need more attention for the bio-diversity studies are Shimoga. Chikmagalur, Dharwar, Hassan and Belgaum. Further. our data suggest that mammals and tree species are reasonably well studied and those which further need attention are invertebrates, microbes, freshwater fishes and reptiles.

The setting:

Western ghats, richly endowed with floral, faunal and habitat diversity, is one of the twelve megadiversity centres of the world. In India, western ghats stands second only to the Himalayan tracts with respect to biological diversity. This include hill ranges from the river Tapti in the north till Kanyakumari in south for about 1600 kms (between 8^0 - 21^0 N and 73^0 to 78^0 E). The chain of hills almost runs paralelly to the western coast of India Due to this setting western slope of the ghats receives most of the rain from south west monsoons as they face the windward direction and eastern slope forms the rain shadow region as they face the leeward direction of the monsoon There is great variation in number of rainy months over the entire ghats, the southern parts receiving rains for nearly 8 months and the northern parts receive 4 months. Bulk of the rain received in the peninsular India is showered at western ghats which fills three major rivers of this region namely, Cauvery, Godavari and Krishna and various tributaries and streams. It's for this reason we have a varied type of habitats available in the entire range of ghats such as tropical wet evergreen, moist and dry deciduous, scrub thorny, shola-grasslands, bamboo thickets, riverine habitats, mangroves, lakes and swamps.

The Importance

A major break-through in the history of inter-continental trade is the discovery of sea route to India by Vasco-da-gama during 16th century which made many spices naturally grown in western ghats exportable to outside world, particularly Europe Even today pepper, cardamom cinnamomum etc., forms a bulk of Indian export market Such a motive to encash the natural resources in a commercial sense was started only after the visit of Vasco-da-gama which led later several Europeans to invade India for its spices This changed the history of India, which attracted many Europeans for its spices and later became a colony of Europe. This ultimately resulted in British ruling the Indian subcontinent for nearly 180 years It's this colonization by British lead to started exploitation of forests in a commercial manner such as extraction of timber, raw materials for various forest based industries like paper mills, match sticks and plywood making Thus the

attraction of income generated through forest and natural resource extraction prompted Britishers to undertake extensive survey work in search of useful forests and areas for mining. This task of intense search for resource probably lead to describing the vegetation of Indian subcontinent and resulted in books like many floras of India by famous taxonomists like Benthom, Hooker, Cook, Talbort, Gamble, Fyson etc., and a very good land surverying machinary was developed in India. Even today, India is one of the best surveyed and mapped country in the world.

Solely with a view to conserve the forest resources which generated lot of income to British Raj, probably for the first time in Indian history the forest areas were considered as state asset and Forest Department was constituted. Several regulations were passed restricting the entry of forest by local tribes as well as villagers and also restricting the resources harvested by local tribes and surrounding villagers for their subsistence. Even after independence, the Forest Department and its regulations continued. Probably the curbing of rights of people over forests created a rough weather among people and the forest department which lead to constant clashes between these groups. Later, the focus of forest department shifted from viewing the forests just as sources of income into the non-cash benefits that the forests confer to the mankind. Therefore the legislation was brought to ban felling of trees for many kinds forestry extractions. Of late, the Government of India seems to have realized the importance of involving people in its forest conservation efforts. In the International Convention on Biological Diversity India has committed to undertake identification and monitoring of its biological diversity.

The objective

In view of signing the convention on biological diversity, it is important to take stock of biodiveristy available in the western ghats. Karnataka Forest Deportment has long been interested in launching a programme on conservation of western ghats involving people (people's participatory project). In this connection, my attempt here is to look into the state-of-the-art of research that have been carried out in the western ghats of Karnataka. Further to understand the gaps in knowledge, particularly about the areas that are least studied, the group of organisms which are not

given proper attention and to collate the information in some organized manner. An effort was made to collect all the information available on distribution and density of various groups of organisms in the western ghats of Karnataka. For this purpose various libraries and Institutions were visited and the available information, either published in journals or books or report form, were collected. In addition, several journals were consulted to get the information. The attempt is made to collect an exhaustive list of references and wherever possible a copy of the literature was collected. Although the list of references so collected does not seem to be exhaustive, but due to limitations of time and constraints involved in travelling greater distances, many cross references were collected from the available literature source than going to the original literature source.

General remarks

A great amount of literature is (references appended as the literature on western ghats) available dealing with the biodiversity of western ghats. Unfortunately much of it is either a qualitative account describing a couple of magnificient organisms such as orchids, tigers or elephants or discovery of new genera or species or a variant morph of a species. A quantitative description of a given organism or a taxa is very limited. One of the examples of such excellent work published from Journal of Bombay Natural History Society is by Prasad et. al (1979) describing the density, distribution and abundance of mammals of western ghats of Karnataka It would be a good step now to compare that data with the current data to understand change in population. The same procedure can be adopted to draw distribution and density maps of other vertebrates such as birds, amphibians, reptiles etc., using the scattered data available at different protected areas in the western ghats of Karnataka. Infact, for most protected areas birds data are available (although not the data on density) which can be used to draw distribution maps of various bird species.

Similarly, vegetation maps prepared by French Institute, Pondicherry, (Pascal 1986) are very useful at gross level to understand different vegetation types over the western ghats of Karnataka. This book let also gives the species available over different forest types. However, the data from the working plan of each division contains the densities of different species of trees at certain intervals

of time which can be used to classify maps based on dominant species and their densities and can draw distribution of species. Further, it can be used to undestand change in species due to forestry operations and can relate the rate of change of species on the intensity of felling etc. The detailed data on distribution of only commercially important species such as Sandal (*Santalum album*), Teak (*Tectona grandis*) and Rosewood (*Dalbergia* sp) are available. Much literature from forestry journals deal with provenance trials of exotic species such as *Eucalyptus* and *Acacia equisitifolia*'s are available, whereas some of the equally important indigenous species such as *Terminalia* have not been studied. Simularly many of fruit yielding tree species which are important in their economic value to local villagers such as Jack fruit (*Artocarpus integrifolia*), Nelli (*Emblica officinalis*), Mango (*Mangifera indica*), Bore (*Ziziphus mauritiana*), Nerele (*Syzizium cumini*) have not been well studied with respect to their occurrence in density. distribution etc.

Gaps in knowledge

Among the literature available a tally was done as to how many papers deal with birds, mammals, vegetation etc., and how many of the papers deal with different districts wherein western ghat hill ranges are found and the data are given in table 1. It is implicit from the table that the districts Chikmagalur, Belgaum. Dharwar. Hassan and Shimoga have hardly any information on many taxa. Although the total number of papers available in each taxa are reasonable enough to describe the minimum literature on the concerned biota. but some districts like Uttara Kannada, Dakshina Kannada and Mysore weight more than the rest. The study are not distributed over all the districts uniformly but are confined to Uttara Kannada. Dakshina Kannada, Mysore and Kodagu. Many times, it so happened that the researchers have described their studies as western ghats, and not specified which locality within the western ghat they have worked. This data thus suggest that we have to concentrate on the areas which have not been fully explored. The districts which need to be given more attention are Chikmagalur. Shimoga, Dharwad, Hassan and Belgaum although these districts have reasonably good forest area (table 2).

The vegetation description of various areas are available in forest working plan of the

respective divisions or through the floras of the districts. However a quantitative account of vegetation are not available apart from the working plans. Emphasis should now be laid to get the quantitative data of various national parks, sanctuaries and reserved forests for the purpose of identification of Zone I area. Further, a common procedure should be followed to cover the diversity of all the strata of vegetation such as canopy, understory, shrub and herbs. For this purpose linear transects of one km long and 10 m wide can be suggested which also takes care of spatial heterogeneity In order to have commonality the procedures followed by the team from Centre for Ecological Sciences (at Sirsi and Kumta) or by the team by French Institute (at Kodagu) or the procedures followed by the team at Tata Energy Research Institute (at BR Hills) can be made use of. Much emphasis is given to study the density of some particular timber yielding tree species. But now we should also emphasize the study of herbs and shrubs apart from studying the other less studied tree species and knowing their distribution.

Much studied species among animals are mammals and birds. Again these studied have concentrated in Uttara Kannada and Mysore. The attempts should be made to study the same in other national parks and sanctuaries in other districts also From among the vertebrates which has been neglected are reptiles. Although there is one book by Daniels (1974) which only describes the south Indian reptiles qualitatively No study yet been done regarding behaviour, density and distribution of these species. Much of the study of fishes have been conducted at Kali estuary and around Karwar rivers The distribution of marine fishes and their distribution of western coast is well documented. However, much needs to be done on inland fish species of riverine habitats (fresh water fishes) and how their distribution are determined. Study on distribution of amphibians have been done to some extent by Ranjit Daniels (1992).

One of the significant taxa of animals which has been neglected are the study of invertebrates which is considered to be contributing a lot to diversity and in terms of their contribution to the total biomass. It is considered that phylum Arthropoda alone contributes greatly to the total biomass of the world. A great deal of interest need to be created among research

workers to undertake this work. The study of molluscs and other invertebrates are worth attempting as there may be interesting patterns discovered in this part of the world. We have excellent opportunity to study these systems as we have varied ecosystems in a very limited area of this western ghats. Another herculean task for biologists is to account for the diversity of lower organisms such as fungi, bacteria, mosses and lichens. As one realizes the tasks ahead to study even one group of insect itself is difficult, it is more difficult to take up diversity studies on these lower organisms. I would not pretend to recommend any suggestions at this stage A lot of discussion is necessary before a criteria to study lower organims are attempted.

In total, although it appears a large body of literature is available, we will have to scrutinize many papers for their worth in considering the work as done, before taking up planning work on the distribution of biodiversity of western ghats. I feel much more exercise is needed to compile already published information and take up further survey work at different districts. It may also be necessary to process published information for the purpose and then look for strategies to plan further.

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Table 1 : The distribution of scientific studies over different districts of western ghats and over different plant and animal groups.

District	General	Tree	Herb	Shrub	Orchid	Mammal	Fish	Bird	Amphi-bians	Microbe	Wildlife general	Insect	Ecology & Environment	Total
Uttara Kannada	6	1					2	3		4	1	3	1	21
Dakshina Kannada							7		1	5		2		15
Shimoga				1				2						3
Dharwar	1					1		2						4
Chikmagalur														-
Hassan	1													1
Mysore	2					3		2			1		1	9
Kodagu	4			1										5
Belgaum														-
Western Ghats (general)	16	18	5	4	2	10	4	4	3		9	3	4	78
Total	31	19	5	6	2	14	13	13	4	9	11	8	7	142

Table 2. The geographical area and forest area (in km^2) and per cent forested area in different districts of western ghats in Karnataka. (Source: Karnataka State Forest Annual report)

District	Geographical area	Forest area	% forest area
Belgaum	13444	2245.67	16.70
Chikmagalur	7221	2179 08	30.18
Dakshina Kannada	8336	5182.30	62.17
Dharwad	13782	1436.73	10.42
Hassan	6622	541.07	8.17
Kodagu	4108	1259.52	30.66
Mysore	12463	4129.62	33.14
Shimoga	10576	3270.16	30.92
Uttara Kannada	10247	8291.51	80.92

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